18 April 2008

M E M O R A N D U M

TO: Thomas Rackow, P.E.
Idaho Falls Regional Office

FROM: Tina Kurtz, Scientist I
Technical Services

SUBJECT: Eagle Farms Wastewater Reuse Permit Application Review -- LA-000207-01 (Industrial Wastewater Facility)

1.0 Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400 (Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater) for issuing wastewater reuse permits. It states the principal facts and significant questions considered in preparing the draft permit conditions or intent to deny, and a summary of the basis for approval or denial with references to applicable requirements and supporting materials.

2.0 Process Description

Eagle Farms operates a potato packaging facility located at 4050 East Lincoln Road in Idaho Falls, Idaho. The facility is situated on a 40 acre section of land, 15 acres of which are employed for land application; though this number will be reduced to 12 acres at the start of the 2008 growing season for reasons which will be discussed further in Section 4.4.

Eagle Farms is considered to be operational for 220 days throughout the year and has been generating an average of 220,000 thousand gallons of wastewater annually; however, as will be discussed in Section 4.5.2.1 it appears as if historically, the bulk of this water has not actually been applied to the land application acreage. The wastewater generated at the facility consists of solely of water used in the whole-potato washing process. The turbid wastewater is sent to a cement lined holding pit located within the plant where it is allowed to settle and is then sent to outside to one of three holding ponds where it is treated with an odor control chemical. All three ponds are unlined, with a total overall storage capacity of 967,500 gal. The ponds are drained via the use of a portable diesel pump which pumps the wastewater from the ponds into a wastewater distribution ditch that employs various weirs for overland spreading of the wastewater onto the field (Portage, 2006). In the fall of 2007 the facility began construction on a new set of ponds that are intended to replace the current ponds and which are discussed further in Section 4.5.21.

3.0 Summary of Events

Eagle Farms has not yet had a wastewater reuse permit. In 1997 the previous owner of the facility, J.R. Simplot, reported to DEQ that all wastewater produced at the plant was discharged to the municipal sewer system. The existence of the facility's wastewater storage ponds and land application activities first came to the attention of DEQ in the summer of 2004 due to repeated nuisance odor complaints from the newly-constructed neighboring subdivision. During the July 7, 2004 investigation of these odor complaints the Department learned of Eagle Farm's wastewater ponds and periodic land application practices and subsequently informed the facility that this was a violation of Idaho rules and regulations. On August 2, 2004 a warning letter was issued, notifying Eagle Farms of the violation and requesting that a written response, specifying what actions the facility would take to remedy the situation, be submitted within 30 days. On September 1, 2004, the Department received a letter from Eagle Farms stating that they had entered into an agreement with Portage Environmental, Inc. to prepare and submit a wastewater reuse application for their facility. A pre-application conference was held between Portage Environmental and the Idaho Falls Regional Office on May 2, 2005, at which point it was determined that the application would be submitted by mid-summer 2005. However, by January of 2006 the application had not been received and on January 19, 2006 DEQ sent a letter requesting its submission. The permit application was finally received on February 21, 2006. The application was determined to be incomplete and a request for additional information was sent on November 5, 2007; this information was due for submittal by December 1, 2007. As no formal response has been received by DEQ, the analysis presented herein is based off of information gleaned during the October 16, 2007 meeting with the facility and the February 2006 permit application.

4.0 Discussion

The following is a discussion of: soils, ground water, surface water, hydraulic management unit configuration, wastewater flows, constituent loading, site management and compliance activities. Conclusions and recommendations are summarized in Section 5 below.

4.1 Soils

According to the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) the soil on land application field is classified as Paesl silty clay loam. Paesl silty clay loam is typically described as being a very deep, well drained soil with slopes of 0-2%. The upper part of the surface layer, which is approximately 5 inches thick, is a brown, mildly silty clay loam, while the lower part of the surface layer is a reddish gray, moderately alkaline silty clay loam that is also about 5 inches thick. A light grayish brown, moderately alkaline silty clay loam about 7 inches thick is found in the subsoil layer. The next 8 inches, the upper part of the substratum, are light gray, moderately alkaline silty clay loam. The remainder of the substratum to a depth of 60 inches or more is very gravelly loamy coarse sand. Overall permeability of Paesl silty clay loam is found to be moderate in the upper part and very rapid in the lower part and the available water capacity (AWC) is low, at about 6.2 inches (NRCS, 2005).

As this site has neither been previously permitted for land application nor has it been individually evaluated and characterized, no chemical data exists for these particular soils. As such, it is recommended that the site be sampled both prior to and following the growing season (April and November) for a number of chemical parameters including DTPA iron and manganese during the first and last years of the permit. For full text of the condition see Section G of the permit.

4.2 Ground Water

As there are currently no monitoring wells present at the facility, little actual data is available for the ground water directly beneath the facility. The facility and the land application site, like much of the Idaho Falls region, is located above the Eastern Snake River Plain Aquifer (SRPA) which extends more than 170 miles from Ashton to King Hill and serves as the drinking water supply for nearly 300,000 residents of southern Idaho (DEQ, 2005). In the Idaho Falls area depth to this regional aquifer is anywhere from 50 to 400 ft below ground surface (bgs) and ground water flow is typically to the southwest. Based off data supplied by the facility's well logs in addition to those for domestic and municipal wells in the area, it appears as if ground water in this particular area begins between 75 to 100 ft bgs.

Many wastewater reuse permits require the installation and maintenance of a ground water monitoring well network in order to ascertain the effect of land application activities on the local ground water. However, based off the current limited site and loading information (Section 4.5.2), the implementation of a monitoring well network is not recommended at this time. Should conditions at the facility change or further monitoring reveal possible ground water concerns, this condition may be revisited.

4.2.3 Municipal Wells in the Vicinity

While there are no monitoring wells present at the facility, there are a number of domestic wells present within a quarter mile radius of the facility in addition to the two production wells which serve the facility itself. According to the source water assessment which DEQ performed in 2002, Eagle Farms' wells have a high susceptibility to inorganic, volatile organic, synthetic organic, and microbial contaminants due to aquifer properties, high countywide agricultural chemical use, and the presence of potential sources of contaminants in the source water assessment area (DEQ, 2002). While the facility wells have never shown contaminant levels above the Environmental Protection Agency's (EPA) Maximum Contaminant Level (MCL), there have been multiple detections of nitrate with concentrations ranging from 1.5 to over 2.0 mg/L, with the most recent detection being in 2005 at 1.82 mg/L. The Eagle Farms wells are located generally up-gradient from the facility, however, making it unlikely that the land application site is the source of the nitrate in the wells (this is an assumption based upon the typical south-southwest flow of the SRPA, further characterization of local ground water would be needed for verification).

As has been previously mentioned, there are a number of municipal and domestic wells located within a quarter mile radius of the facility. Due to the close proximity of some of these wells to both the facility and the land application site it is recommended that all domestic and municipal

wells within this radius undergo a well location acceptability analysis. For the full text of this condition see CA-207-08 in Section E of the permit.

4.3 Surface Water

Eagle Farms' land application site is bordered on the western edge by an irrigation ditch which is fed by Little Sand Creek and used for supplemental irrigation purposes. This irrigation ditch is located inside the standard buffer zone, which in this case is 50 ft. For further discussion of buffer zones as well as the criteria for alternative buffer zones see Section 4.7.

4.4 Hydraulic Management Unit Configuration

Eagle Farms possesses a 15-acre field which is located directly adjacent to both the fresh pack operation and the wastewater ponds. According to the facility, three acres located at the southern end of the site have been donated to the Cloverdale School for use as a bus turnaround; effectively reducing the land application acreage to approximately 12 acres. It is recommended that these 12 acres comprise one management unit to be designated with the serial number MU-020701.

4.5 Wastewater Flows and Constituent Loading Rates

Trending of wastewater flow rates and rationale for constituent and hydraulic loading rates appearing in the permit are discussed below.

4.5.1 Wastewater Flows

During the course of their daily fresh pack operations the facility fills their 1,000 gallon sump once, which comprises the total amount of water used in their washing processes and therefore their wastewater generation. Given a 220 day operating season, this leads to an annual wastewater production rate of approximately 220,000 gallons per year. According to the facility, plans are underway to implement a water reduction system which could lower this number by 50 – 75%. However, as no concrete deadline or plans have been submitted for this system, recommendations for the permit will be based off current wastewater generation rates.

4.5.2 Constituent Loading Rates

The sections below discuss proposed constituent loading rates, including hydraulic, nitrogen, total dissolved solids, chemical oxygen demand (COD), and phosphorus. Recommended loading rates for inclusion into the permit, Section F, are also discussed.

4.5.2.1 Hydraulic Loading Rates

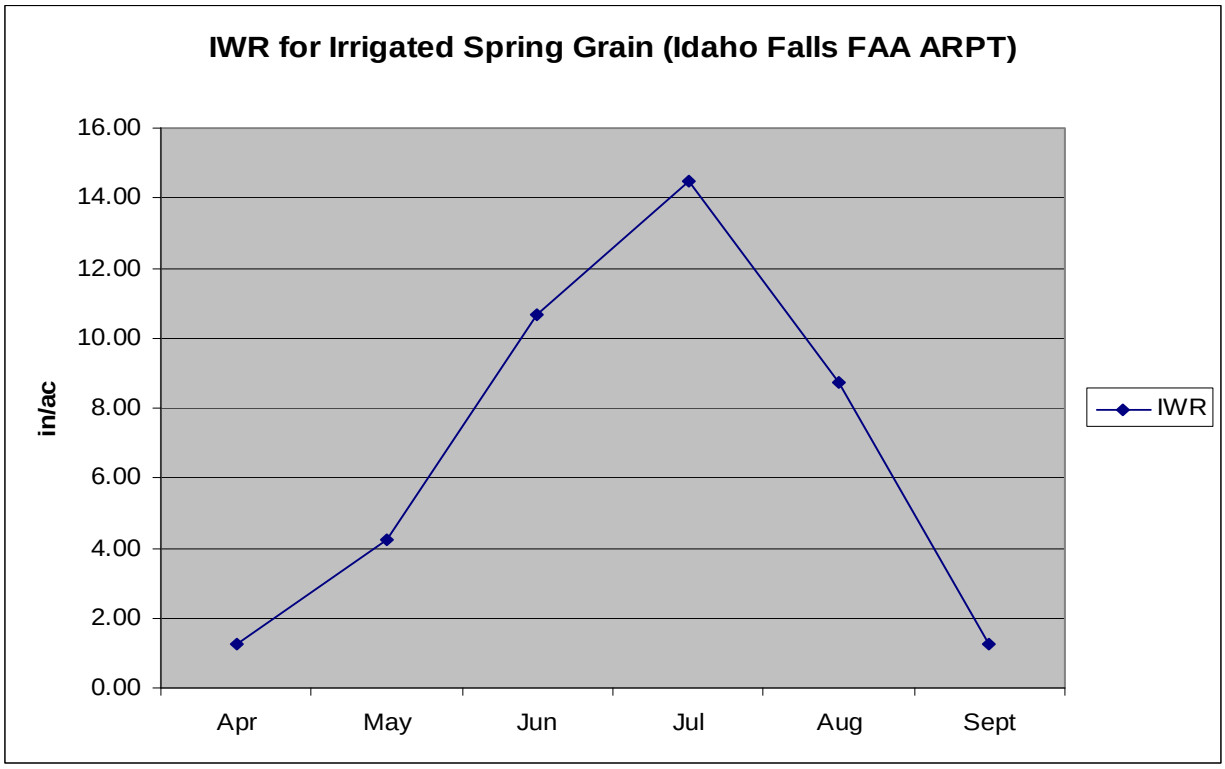
In theory, growing season hydraulic loading should substantially be the irrigation water requirement (IWR) for the crop in question. The facility reports that the site was planted with wheat in 2007, irrigated with wastewater from the holding ponds as well as supplemental water pumped from a nearby canal. The supplemental irrigation was applied via wheel lines while the

wastewater was applied via flood irrigation. For various reasons the actual application rates of each during previous years remains unknown; with regard to supplemental irrigation this anonymity is simply due to the fact that the facility failed to record their water usage, while the issue of wastewater application rates is slightly more complicated.

For a number of years the facility has been employing a series of three unlined wastewater holding ponds for storage prior to land application. The total capacity of all three combined is approximately 967,500 gallons, which in theory should be more than enough to retain any wastewater generated during the non-growing season for use on the field during the growing season. However, being that the ponds are unlined it is probable that their seepage rate is fairly significant. Consequently, it is difficult to ascertain exactly how much wastewater is actually being applied to the field and how much is being lost through the ponds.

The approximate total IWR for irrigated spring grain grown by flood and wheel line irrigation in the Idaho Falls area is 40.6 inches per acre (in/ac). Even if the facility seals their ponds and begins retaining all of the wastewater generated, they will be loading only an estimated 0.68 in/ac-yr. Clearly, the bulk of water for any crop grown by the facility will have to be provided by supplemental irrigation.

The graph below illustrates the 30 year irrigation water requirement for irrigated spring grain and an assumed 60% irrigation efficiency (Allen, 2007c).



It is recommended that the facility generally adhere to the IWR for the crop in question in order to facilitate both productive crop yield and crop nutrient uptake. If the facility should decide to change crops a new IWR should be calculated. For the full text of this condition see Section F of the permit.

In addition to their probable high seepage rates, the ponds also appear to be the most significant contributor to the number of odor complaints which DEQ has received with regard to the facility, partly due to the fact that they are difficult to dredge and partly due to the fact that they are located in close proximity to a neighboring subdivision. Acknowledging these issues, Eagle Farms constructed new ponds in the fall of 2007, transplanting them further from the neighbors, on the western side of the fresh pack shed. The new ponds are constructed out of concrete, with an estimated capacity of 28,800 gallons, however, when DEQ met with the facility in October of 2007 they were without floors and had not yet been put into service; their current status is unknown.

However, the future employment of these new ponds, whenever it occurs, poses another issue. It is evident that their capacity is considerably less than those ponds used currently, little more than 13% of the annual wastewater generation rate. The facility operates five days a week year round, with the exception of holidays, etc., which leads to an estimated 103 days of operation and 103,000 gallons of wastewater for the non-growing season. Consequently, given the fact that a fair amount of the wastewater production occurs during the winter months, it appears as if non-growing season land application will become necessary unless the facility adds a significant amount of storage capacity or implements other wastewater disposal options such as discharging to the municipal sewer that is currently available at this location.

DEQ typically calculates NGS hydraulic loading rates based off the following formula:

HLR_{ngs}= Soil Available Water-Holding Capacity (AWC) – Precipitation + Evapotranspiration

Given a soil AWC of 6.2 in, along with the non-growing season precipitation for the area (4.32 in) (Allen, 2007a) and the evapotranspiration for irrigated spring grain (2.16 in) (Allen, 2007b); the NGS hydraulic loading rate for the facility is approximately 4.04 in/ac per season. While this seems like a relatively restrictive amount, the facility only generates 0.68 in/ac during the entire year, as was discussed previously, with approximately 0.32 in/ac of that taking place during the non-growing season.

In general, flood irrigation is not the preferred method for land application during the non-growing season due to the potential for prolonged periods of saturation at the head of the furrow and uneven spreading over the site. However, given the low amount of water being land applied over the course of the winter months to such a small field that is not the case here. Taking into account the site's AWC and a non-growing season loading limit, which is over 120% greater than the expected generation rate, it is likely that any wastewater applied in reasonable increments would be absorbed relatively quickly. In addition, the use of a winterized sprinkler system is actually rather impractical in this situation due to the fact that the facility would neither be able to generate nor apply enough water on a consistent basis to keep such a system thawed and operational.

4.5.2.2 Nitrogen Management and Loading Rates

Wastewater reuse permits typically include a nitrogen loading rate limit of 150% of typical crop uptake and based upon the limited data available the facility is not likely to exceed this limit. In October of 2005 the facility sampled the wastewater in the holding ponds for total dissolved solids (TDS), total suspended solids (TSS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and total Kjeldahl nitrogen (TKN). It appears as if this is the only wastewater sampling which has been performed and therefore it is these values upon which the constituent loading calculations are based. For the complete sampling results, see Table 1 in Appendix 2.

Given the measured TKN concentration in the October '05 sampling and a hydraulic loading rate of 220,000 gallons, the facility would be loading approximately 9.0 pounds per acre per year (lb/ac-yr) of nitrogen. An assumption of 0.86 lb per bushel crop uptake for wheat (NRCS, 2007) along with an average yield of 85.7 bushels per acre, which is the USDA National Agriculture Statistics Service (NASS) average for irrigated spring wheat in Bonneville County from 2002-2006 (NASS, 2008), gives a projected total crop nitrogen uptake of 74 lb/ac-yr. As the projected loading is approximately 12% of the projected crop uptake, it seems likely that the facility will be able to meet the 150% standard with their current methods provided the crop receives sufficient supplemental irrigation. For the full text of this permit condition see Section F of the permit.

4.5.2.3 Total Dissolved Solids (TDS) Loading Rates

Total dissolved solids (TDS) loading rates from wastewater and irrigation water can have significant impacts to ground water TDS levels. Total dissolved solids measured in ground water are commonly inorganic constituents (salts). TDS in wastewater can include significant quantities of organic constituents in addition to salts. For modeling and other environmental evaluation purposes, inorganic wastewater TDS as well as volatile dissolved solids (VDS) is important to measure. The difference between these two can be used to calculate non-volatile dissolved solids (NVDS), which can be used to roughly estimate the concentration of salts in wastewater and subsequently the salt loading to the land application site.

During the October '05 sampling, however, the wastewater was only sampled for TDS, so an estimation of salt loading to the site will be rather higher than what might actually occur. With that having been said, the estimated TDS loading at a 220,000 gallon per year application rate is approximately 100 lb/ac-yr. Given the operating timeframes and limited amount of storage it is feasible that wastewater loading will take place at a fairly consistent pace throughout the year. If this is need the case, modeling indicates that little to no leaching should result, leading to a low probability of ground water impacts from the TDS loading rates.

4.5.2.4 COD Loading Rates

Wastewater Reuse permits typically include a chemical oxygen demand (COD) permit loading rate limit of 50 pounds/acre-day (lb/ac-day) per season. If wastewater COD concentrations remain similar to that of the October '05 sampling, it seems unlikely that the facility will exceed

this limit. The concentration during this sampling was 130 mg/L which would give an estimated average COD application rate of 0.04 lb/ac-day per season. Therefore it is recommended that the facility be held to the standard 50 lb/ac-day per season COD loading limit. For the full text of the condition see Section F of the permit.

4.5.2.5 Phosphorus Loading Rates

Generally, phosphorus loading rate limits are set by DEQ based upon ground water to surface water interconnection concerns. However, as this is the initial permit for this site, the phosphorus concentrations of the facility's wastewater are unknown. Therefore, it is difficult to determine both the loadings to the site and their subsequent impacts to ground water and surface water. It is recommended that wastewater phosphorus concentrations and loading rates be monitored and that the field's plant available phosphorus levels be monitored during soil samplings. A loading rate limit may be reconsidered should surface water contamination become a concern. For the full text of the monitoring conditions see Section G of the permit.

4.7 Buffer Zone and Site Management

As has been previously mentioned, there is at least one irrigation ditch bordering Eagle Farms that is located inside the recommended buffer zone distance for an industrial facility utilizing flood irrigation and located in a suburban area. Those recommended buffer zones are as follows:

- 200 ft from reuse site and inhabited dwellings
- 50 ft from reuse site and areas accessible by the public
- 100 ft from reuse site and permanent and intermittent surface water
- 50 feet from reuse site and irrigation ditches and canals
- 500 feet from reuse site and private water supply wells
- 1000 feet from reuse site and public water supply wells
- Berms and other BMPs shall be used to protect the well head of on-site wells.

The facility states that the irrigation ditch on the western side of land treatment area is protected by a 2-3 ft berm which surrounds the site in an effort to prevent runoff to these waters. However, in order for the alternative buffer zones to be accepted it is recommended that the facility submit a comprehensive Buffer Zone Plan and Runoff Control Plan, including exact buffer zone distances, and details and schedules of berm maintenance. For full text of these conditions see Section E, CA-207-06 and CA-207-07, of the permit.

In February of 2006 the facility submitted an Odor Management Plan, detailing plans for the prevention of the nuisance odors which had been the source of a number of complaints against the facility in previous years. The plan included the addition of liquid bleach to the settling pit within the plant as well as the periodic sprinkling of an "odor control chemical" over the outdoor holding ponds. Additional research into more effective odor control methods was also called for and hybrid poplars were to be planted along the eastern border of the property (Portage, 2006). As this plan was conceived in the winter of 2006, in theory it should have been implemented during the 2006-2007 growing season. In spite of this, however, the Idaho Falls Regional Office

received a number of odor complaints during the summer months, mainly concerning the holding ponds.

During the meeting between the facility and DEQ in October of 2007 it was learned that liquid bleach was no longer being employed in the settling pit and an odor control chemical called Envirolagoon was being added according to manufacturer's specifications in the holding ponds. Though the facility still plans to install the hybrid poplars, prior activities on the site involving herbicide use have rendered the area temporarily infertile and it may be several years before the trees can be planted. In light of the number of changes to both the odor management plan as well as the addition of the new ponds and the possibility of non-growing season application, it is recommended that the Odor Management Plan be revised as a condition of the permit. For the full text of this condition see CA-207-03 in Section E of the permit.

In the application the facility stated that waste solids are removed from the lagoons once every two years. It is likely that this accumulation of sludge in the holding ponds is a significant source of nuisance odors, along with the fairly prolonged hydraulic retention times during which the wastewater is without aeration. It is recommended that the facility create a Waste Solids Management Plan to more effectively deal with the solids buildup in the new ponds in order to prevent the reoccurrence of these issues. A more comprehensive pre-treatment process, possibly including additional silt settling pits in series, might also be advisable to reduce the amount of solids entering the lagoons. For the full text of the compliance activity see CA-207-02, Section E of the permit.

4.8 Plan of Operation and Other Compliance Activities

Section 1.0 of the Application (page 1) states that a facility plan of operation would be submitted after permit issuance as an anticipated permit compliance condition; it is understood that a plan of operation is a living document and is modified as operations and regulatory requirements change. Section E, condition CA-207-01, as it appears in the permit requires the facility to submit a Plan of Operation for DEQ review and approval. For the full text of the condition, see Section E of the permit.

In order to address the issue of the decreased buffer zones for the irrigation ditch which borders the site, the facility is required to submit a comprehensive Buffer Zone Plan and Runoff Control Plan which includes specific buffer zone distances and detailed maintenance plans for the berms around the land treatment site. For the full text of these compliance activities see Section E, CA-207-06 & CA-207-07.

It is also recommended that a more detailed Nuisance Odor Management Plan be submitted, which includes plans on how the facility intends to eliminate odors once they are present, particularly in the summer months. In keeping with the goal of odor elimination, a Waste Solids Management Plan is also recommended in order to more effectively manage this particular source of holding pond odor. For the full text of both these compliance activities see Section E, CA-207-03 and CA-207-02, respectively.

As discussed previously, the facility has recently installed new wastewater holding ponds which are meant to replace the old, unlined ones that have been a significant source of odor at the site. The completion status of these ponds, however, is currently unknown. Compliance Activity CA-207-04 requires that the facility complete the ponds, if they have not already done so, and schedule an appointment to have DEQ witness this completed construction prior to putting them into service. The activity also requires that the facility seepage test them to ensure that they meet DEQ's standards for new structures. In addition, Compliance Activity CA-207-05 requires that all engineering plans and specifications for the new pond structures be submitted to the Department for review (as required by IDAPA 58.01.16.401). Finally, Compliance Activity CA-207-09 requires the submission and implementation of a plan for the closure of the old ponds. For the full text of these conditions see Section E of the permit.

Though monitoring wells are not being required at this time, due to the close proximity of the site to a number of domestic wells, it is recommended that a Well Location Acceptability Analysis be performed for applicable wells located on or around the site. For the full text of this condition see Section E, CA-207-08.

5.0 Conclusion

The following recommendations fall into two major areas. They include loading rate related recommendations and ground water related recommendations.

5.1 Loading Rate Related Recommendations

1. It is recommended that the field be managed and loaded hydraulically during the NGS according to the rate proposed and discussed in Section 4.5.2.1. See Section F of the permit.

2. COD loading rates should be 50 lb/acre-day average per season as discussed in Section 4.5.2.4. See Section F of the permit.

3. It is recommended that all fields have a nitrogen loading rate of 150% of median crop uptake as discussed in Section 4.5.2.2. See Section F of the permit.

5.2 Ground Water Related Recommendations

1. It is also recommended that well location acceptability analyses be performed for all domestic and municipal wells within a ¼ mile radius of the reuse site as discussed in Section 4.2.3. For the full text of this compliance activity see CA-207-08 in Section E of the permit.

2. Based off the current limited site and loading information, the implementation of a monitoring well network is not recommended at this time. However, should conditions at the facility change or further monitoring reveal possible ground water concerns, this condition may be revisited. For further discussion see Sections 4.2 and 4.5.2.

6.0 References Cited

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Appendix 1

Figure 1. Management Unit Configurations and Pond Locations**.**

Appendix 2

Table 1. Results of the October 18, 2005 Wastewater Pond Sampling

Analyses	Result (mg/L)
Total Dissolved Solids (TDS)	810
Total Suspended Solids (TSS)	20,000
Biological Oxygen Demand (BOD)	200
Chemical Oxygen Demand (COD)	130
Total Kjeldahl Nitrogen (TKN)	74